INFORMATION TECHNOLOGY IMPACTS ON POWER AND INFLUENCE

Soonchul Lee
Michael E. Treacy

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CISR WP No. 156
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Center for Information Systems Research
Massachusetts Institute of Technology
Sloan School of Management
77 Massachusetts Avenue
Cambridge, Massachusetts 02139

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Abstract

In this paper, we explored a model of Information Technology (IT) impacts on personal power and influence in an organization. Our focus was on how IT can be used to increase the potential power and influence of an individual. Drawing from the perspective of power base theory, we identified five bases of power: 1) resource provision, 2) irreplaceability, 3) authority, 4) network centrality, and 5) expertise. To explore this conceptual model, data were collected from 136 users who used well-established information systems. The data provided general support for our model that IT's impact on personal influence can be explained through its effects on the five power bases. In particular, the data indicated that network centrality was the most significant contributor to the effect of IT usage on personal influence for administrative personnel, while resource provision was the most significant factor for technical personnel.

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1. INTRODUCTION

The notion that power and influence are based largely on some set of power resources is popular among researchers, and appears theoretically strong [Cobb 1980]. Researchers agree that personal influence in organizations is both a matter of structure (*i.e.*, having a position of authority), and of individual skills in understanding and manipulating organizational processes [Pfeffer 1981]. Information Technology (IT) can enhance personal influence in several ways. For instance, a member may be able to enhance his contributions in a decision making process because electronic mail permits him easier and speedier access to relevant information. Another member may have gained influence through his expertise in skills related to IT usage.

Despite the apparent impact of IT on personal influence, there have been few studies on the impacts of IT on power or personal influence in business organizations. The few exceptions are studies on power and the implementation process [Markus 1983, Robey and Markus 1984]. Markus [1983] examined implementors' theories regarding the causes of resistance to the introduction of information systems. She claimed that interaction theory, a version of political theory, better explained users' resistance. Robey and Markus [1984] compared the adoption of rational perspectives with power/political perspectives in explaining the implementation process, and concluded that these perspectives complemented each other in predicting the effective deployment of information systems.

Few studies have attempted to link the usage of information systems to personal influence and power. In this paper, the focus will be on how the introduction of IT affects the bases of power. Unlike the majority of past research which has studied the relationship between power base utilization and either compliance with supervisory directives or measures of production [Cobb 1980], we will focus on

measuring the relationship between power base utilization and an individual's informal influence in the organization.

In Section Two, we explore a model of IT impacts on power and influence based on the theoretical perspectives reviewed. The seven hypotheses for this study are presented following the discussions of power bases which IT can affect. Section Three is a description of the design of the research we conducted. Section Four consists of the analyses of data and results. The hypotheses are tested mainly by correlational analyses from the questionnaire data. In addition, we attempt to explain or predict the relative influence of each power base on perceived power through multivariate analyses. Section Five comprises discussion and concluding remarks.

2. A MODEL OF INFORMATION TECHNOLOGY IMPACTS ON INFLUENCE

Power and influence have on occasion been operationalized to capture the same construct and have been used interchangeably. Therefore, even though we are primarily interested in personal influence within an organization in this paper, we will build our theoretical foundation from the power literature. A brief review of the literature illustrates the range of definitions and applications in conceptualizations of power and influence.

In classical behavioral theory, personal power in bureaucratic organizations is thought to be based on *de jure* authority related to roles. Weber [1978] claimed that a bureaucratic role conferred on an incumbent the right to act in a clearly defined sphere of competence and, in a hierarchy, higher level incumbents had more authority than lower ranking incumbents. While classical behavioral theory assumes that power is delegated from above, neoclassical theory emphasizes the

importance of acceptance of power from the target population [Simon 1957]. Personal power or influence, although linked to one's position, is not the same as legitimate authority. Kanter [1977], for instance, claimed that power in an organization did not imply hierarchical domination but rather the ability to get things done. Similarly, Cartwright and Zander [1968] and Porter *et al.* [1981] defined influence as the extent to which a target seriously considers the wishes of the agent. Therefore, power is not rooted in the structure of roles, but it depends on such personal factors as skills and expertise. Many recent studies of organization science have thus defined power as a capacity of social actors to overcome resistance on the part of other social actors in order to achieve desired objectives or results [Dahl 1957, Pfeffer 1981].

Many researchers have assumed that power is realized only in dyadic relationships between social actors. Wrong [1968], however, asserted that power need not be exercised to exist. Even though power is usually defined as the capacity to control others, he emphasized that there is a distinct difference between the capacity to control and the actual practice of control. The distinction is between potential and enacted power [Provan *et al.* 1980]. Cobb [1984] extended this concept by differentiating power study methodologies into an episodic approach and a dispositional approach. The episodic approach examines the execution of power. The focus is on the means through which power is used [Cobb 1980, Wrong 1979, Hindess 1982]. The episodic approach, therefore, corresponds to Provan *et al.*'s [1980] notion of enacted power which requires the existence of dyadic relationships among social actors. The dispositional approach, on the other hand, views power as the capacity or potential to affect change if required, which corresponds to Provan *et al.*'s [1980] notion of potential power. Our focus in this paper is on how information technology can support the individual in increasing

influence or power potential, not on the actual usage of power in a specific setting. Hence, we choose to adopt the dispositional approach [Cobb 1984]. We will not restrict ourselves to top down influence, but will include lateral influence among workers and upward influence over supervisors. In addition, our concern is to link power bases to personal influence perceived with IT usage, not to general personal influence.

Drawing from the perspectives of power base theory, we identified five distinct bases of power: 1) resource control, 2) irreplaceability, 3) authority, 4) network centrality, and 5) expertise. The IT impacts on personal influence through the power bases will be examined for two categories of social actors: the ones who are directly related to the organization's core technology and the ones who provide administrative support. Hypotheses for this study are presented following the discussions in each subsection.

2.1. Resource Control and Irreplaceability

The resource dependency perspective [Aldrich 1976, 1979, Pfeffer and Salancik 1978] provides a suitable general framework for studying IT impacts on influence. It applies ideas from social exchange theory [Emerson 1962, Blau 1964] to interpersonal dependencies created by the needs of all social actors to acquire scarce resources [Provan *et al.* 1980]. The resource dependency perspective has dominated the power literature [Pfeffer and Salancik 1978]. This perspective suggests that the individuals who can provide the most critical and hard-to-obtain resources ascend to power in an organization [Pfeffer 1981].

Pfeffer and Salancik [1978] identified two related elements that are critical in determining the dependency of others on a social actor: the importance of the resources and the extent to which the social actor has discretion over resource

allocation. Arguing from the perspective of resource dependency, Hackman [1985] asserted that influence is inversely proportional to the substitutability of the social actor (*i. e.,* the extent to which resources are available from other social actors).

Resource Provision: Pettigrew [1972, 1973] investigated the communication patterns in the choice process of a new computer and reported that power accrued to the individuals who served the role of gatekeeper. The gatekeeper can affect the decision process by restricting or distributing the information and organizational resources required by others. IT can enhance an individual's power through the ability to provide information valuable to others. Many studies which investigated the relationship between MIS department and user departments reported that the MIS department usually had relatively more power because it provided the information flow of the organization [DeBrabander and Thiers 1984].

Irreplaceability: Irreplaceability refers to the difficulty with which the duties of a person can be performed by a substitute person. The more easily the duties of one person can be performed by another, the less power he will develop [Dubin 1957, Emerson 1962]. Crozier's [1964] study of tobacco plants found that maintenance engineers controlled the running of machinery, and their capacity to cope with breakdowns could not be replaced. The engineers came to have inordinate power because their skills were irreplaceable. A person's unique ability to cope with computer-based information systems may be an irreplaceable skill. Saunders [1981] claimed that although IT automated and routinized simple tasks, nonsubstitutability may be enhanced by increasing the variety and complexity of departmental tasks through enhanced information processing capability. Therefore, we speculate that a computerized environment can contribute to irreplaceability of a social actor.

Based on the discussions presented, the first two hypotheses were constructed:

H1: The greater the impact of IT on resource provision, the greater the effect of IT usage on personal influence.

H2: The greater the impact of IT on irreplaceability, the greater the effect of IT usage on personal influence.

2.2. Authority

Astley and Sachdeva [1984] claimed that the popularity of power-dependency theory should not allow one to overlook the long-standing central importance of hierarchical authority because Weber's [1978] bureaucratic authority power lies at the heart of hierarchical differentiation of power. While Astley and Sachdeva's [1984] authority refers to the power that derives from occupying a higher position in the organizational structure, authority corresponds to responsibility in our context as IT cannot directly change an individual's hierarchical position.

Positional power is the primary focus in bureaucratic organizations since the formal position determines the resources available to the incumbent. Three of French and Raven's [1959] power bases - legitimate, coercive, and reward power - are strongly related to positional power. Cobb's [1980] empirical analysis of the relationships between influence and French and Raven's power bases found that legitimate power was the single most important factor. We believe that IT in itself cannot change the organizational structure, but it can affect the authority or responsibility of an individual by increasing his information processing capability.

Pfeffer [1978] reviewed Pfeffer and Leblebici's [1977] study on IT impact on decentralization and reported that IT enabled the apparent delegation of decision-making authority because it provided the management with comprehensive information on performance. Zuboff's [1983] field survey of IT impact on process plants reported that the lower subordinates assumed more power and increased

responsibility because they had greater operational proximity to the relevant decisions and were provided with accurate data and procedures.

Hence, the following hypothesis was constructed:

H3: The greater the impact of IT on authority/responsibility, the greater the effect of IT usage on personal influence.

2.3. Network Centrality

Power is dependent on a social actor's position in the network. Tichy and Fombrun [1979] argued that organizational power relationships can be analyzed by studying networks of interactions. Actors located at hightly interconnected nodes in the network gain power because their immersion in multiple interdependencies makes them functionally indispensable [Astley and Sachdeva 1984, Dubin 1957, Hickson *et al.* 1971, Mechanic 1962]. Hinings *et al.* [1974] claimed that pervasiveness is a determinant of power since it describes the interdepartmental communication and other interactions among subunits.

Mechanic [1962] asserted that an individual's power is positively related to his ability to access organizational resources such as people, information, and instrumentalities. Allen [1970] in his study of communication networks in R&D laboratories discovered that high performers not only reported a significantly greater frequency of consultation with organizational colleagues, they also spent significantly more time in their discussion with colleagues. Peltz and Andrew [1966] argued that the variety of contacts and their frequency contributes independently to performance. Information systems, especially electronic mail capabilities, can assist a social actor in gaining access to a variety of experts and customers.

The actors located at central nodes in the network exert considerable power. Computerized communication can help organizational members become more

active and attentive by eliminating the obstacles to voluntary participation, such as the fear of embarrassment, insecurity, and other influential factors in human interaction [Hiltz and Turoff 1978]. Increased frequency of contact with others facilitates a social actor's ability to provide resources for others, hence enhances his power. Foster and Flynn's [1984] case study of General Motors' divisions reported that changed organizational communication due to the implementation of information systems caused the flow of power to the obvious centers of communication.

Hence, the following hypothesis was constructed:

H4: ***The greater the impact of IT on network centrality, the greater the effect of IT usage on personal influence.***

2.4. Expertise

Expertise refers to the knowledge the social actor brings to the organization. Several studies have noted that power relations take place within the context of a larger environment. For instance, Benson [1975] applied Zald's [1970] political economy approach to interorganizational power relations to argue that power in interorganizational networks is based not only on internal network exchange, but also on external linkages to the larger environment [Provan *et al.* 1980]. This external linkages to the environment can be augmented through the understanding of the problems faced by a social actor. The argument can be applied to the context of IT impact on personal influence. A social actor who exists in the open system can increase his power not only by increasing pairwise dependencies between social actors, but also by maintaining links through information systems to the larger environment [Benson 1975]. Expertise can be viewed as a major source of linkage with environment which the social actor must

deal with. Consequently, the social actor who can cope with the uncertainties arising from the external environment will have more power.

Zuboff [1983] examined IT impacts on managerial jobs and reported that monitoring and decision-making based on fairly routine information was added to the jobs that had the greatest operational proximity to the relevant decisions, because the increased information processing capability due to IT increased the level of knowledge of lower subordinates. IT, therefore, enhances the information processing capability of an individual and thus enables him to make better decisions. Besides, IT speeds up the feedback to the decision and thus enables him to better understand the impacts of the decision.

Furthermore, information systems may enable a social actor to learn specific skills outside of jobs to which he is assigned. Gerrity [1971] studied the impact of portfolio management information systems on bank managers, and concluded that the managers developed extended knowledge with the information systems. We believe that the new developed knowledge helps a social actor accrue power.

Hence, the following hypothesis was constructed:

H5: ***The greater the perceived impact of IT on expertise, the greater the effect of IT usage on personal influence.***

2.5. Task Characteristics

The study presented in this paper examines IT impacts on influence based on five power bases. In addition, we will test separately the relationships for two types of social actors: those whose jobs are directly related to the organization's core technology and those whose jobs are related to administrative concerns.

Hackman [1985] defined centrality as the closeness with which the purpose of a unit matches the central mission of the institution. Groups which are closest to the central mission are called core groups and other groups are peripheral groups. After investigating resource allocation within a university, she reported that core programs, such as academic programs, gained internal influence when they acquired environmental resources that contributed to their own purposes. On the other hand, peripheral programs, such as administrative offices, gained influence internally when they focused on broader institutional needs and brought in external resources that contributed to the whole.

In this paper, we will classify tasks as being either technical or administrative. Technical personnel are defined as the ones who use organizational core technology, and administrative personnel are the ones whose main responsibility is the support of the core activities. Technical personnel are central to the organizational core technology, therefore, they gain influence by enhancing their technology. Administrative personnel's influence is not dependent on organizational core technology but on the linkage between various organizational functions. Therefore, we hypothesize that these two types of organizational personnel differ in their sources of power. Specifically, technical personnel gain influence by increasing their expertise and administrative personnel accrue power by having more connections to other people.

Based on the discussions presented, the following hypotheses were constructed:

H6: For administrative personnel, the impact of IT on network centrality is the most important contributor to the effect of IT usage on personal influence.

H7: For technical personnel, the impact of IT on expertise is the most important contributor to the effect of IT usage on personal influence.

3. METHODOLOGY

3.1. Sample

The sample in this study consisted of information systems users at seven case sites. The sites were various departments, including legal support, sales support, corporate planning, legal service, engineering, purchasing, and computer support, in several large manufacturing firms. In selecting the sample, only sites with extensive information systems usage were considered. The responses from each site were subjected to ANOVA tests and no significant differences were found to exist across case sites.

3.2. Procedure

The item pool for a Likert-type questionnaire was constructed to measure the five *a priori* factors identified through literature review. The users could answer eleven statements descriptive of the impacts of IT with a Likert response format with seven response alternatives ranging from strongly disagree to strongly agree. Four general questions specifically asked for the respondent's perceived impact of IT on influence. Three of these questions dealt with power/influence perceived with IT usage and the fourth with formal span of control changed with IT usage.

Questionnaires with attached cover letters and stamped return envelopes were mailed to 180 users of information systems at the seven case sites. Out of the 180 questionnaires sent, 136 were completed and returned, representing a response rate of 75.6%. The sample size was later reduced to 110 by deleting respondents

who had left an excessive number of items unanswered, and those who had responded consistently in a specific scale over successive number of items. Pair-wise elimination was used in the treatment of individual missing data.

3.3. Measures

The items that constituted our questionnaire to study the impact of IT on power and influence are summarized in Table 1. The means and standard deviations of the item scores are as shown. We constructed a new set of questions for this study because we could not find existing ones which were appropriate for our purposes. We wanted to measure the change in power/influence due to IT usage. The opinions were to be sought from the users themselves because we were interested in measuring power perceived, not the actual realization of power. Therefore, the perceptive measures instead of hard measures were appropriate for the purposes of this study.

As this questionnaire has not been used in the past and the number of questions was relatively small, we report a series of tests conducted to ensure that the questionnaire measures exhibit desirable properties.

Correlation: The correlation matrix for the eleven items in the five constructs is given in Table 2. Scanning the correlation matrix indicates that items in all the five constructs were indeed highly correlated within the same construct (all with correlation coefficients of greater than 0.5). Therefore, items in the same construct appear to measure the same factor intended.

Reliability: The Cronbach alpha coefficients for RP, AU, NC, and EX were 0.85, 0.79, 0.79, and 0.79 respectively. The overall reliability coefficient was 0.88.

Convergent and Discriminant Validity: The multitrait-multimethod (MTMM) [Campbell and Fiske 1959] approach to convergent validity tests whether the

IT Impacts	Abbreviation	Operationalization	Mean (S.D.)
Resource Provision (RP)	RP1	The information system allowed me to help other group members access specific information	4.97 (1.51)
	RP2	The information system allowed me to help group members use the system better.	4.98 (1.39)
	RP3	The information system allowed more people to refer to me for help.	4.77 (1.59)
Irreplaceability (IR)	IR1	The information system made me indispensable to the group.	2.58 (1.51)
Authority (AU)	AU1	I have gained more authority to carry out my responsibilities because of the information system.	3.58 (1.87)
	AU2	I now have more freedom to decide how to do my work without prior managment approval.	3.65 (1.71)
Network Centrality (NC)	NC1	More people are accessible through the information system.	5.41 (1.52)
	NC2	The information system has made more experts accessible.	4.35 (1.75)
	NC3	The information system has made it easier to consult with others about problems.	4.84 (1.78)
Expertise (EX)	EX1	The information system has allowed me to develop a variety of skills.	5.12 (1.38)
	EX2	The information system has increased my opportunities for learning outside of my assigned tasks.	4.66 (1.77)
General Questions (GQ)	GQ1	The information system allowed me to influence more people within the group	3.79 (1 95)
	GQ2	The information system increased my ability to influence the outcome of events within the group	3.84 (1.87)
	GQ3	In general, the system has increased my influence within the group.	4.04 (1.79)
	GQ4	The information system has increased the number of people reporting to me.	1.93 (1.38)

Table 1
IT Impacts on Influence and Their Operationalizations

correlations between measures of the same theoretical concept are different from zero and sufficiently large to warrant further investigation. The smallest within-variable correlation was 0.571, between NC1 and NC2. For a sample size of 110, this

	RP1	RP2	RP3	IR1	AU1	AU2	NC1	NC2	NC3	EX1	EX2
RP1	-										
RP2	.762	-									
RP3	.643	.719	-								
IR1	.386	.372	.478	-							
AU1	.413	.379	.422	.302	-						
AU2	.380	.413	.421	.442	.654	-					
NC1	.334	.313	.349	.137	.212	.081	-				
NC2	.401	.350	.394	.324	.309	.273	.571	-			
NC3	.452	.509	.482	.225	.297	.329	.574	.664	-		
EX1	.417	.546	.441	.228	.529	.564	.220	.279	.397	-	
EX2	.336	.317	.273	.212	.413	.415	.147	.243	.366	.622	-

Table 2
Correlations among Item Measures

was significantly different from zero ($p < 0.01$) and large enough to encourage further investigation.

Discriminant validity was tested using a revised form of the MTMM approach by counting for each measure the number of times that it correlates more highly with a measure of another variable than with measures of its own theoretical variable. None of the 94 comparisons violated the discriminant validity test. In other words, each of the correlations between different measures of the same construct was greater than the correlations with measures of different constructs. Therefore, the measures for all five factors displayed good convergent and discriminant validity.

3.4. Dependent Variables

The dependent variables used in the study were the four general questions, GQ1, GQ2, GQ3, and GQ4 as shown in Table 1. GQ1, GQ2, and GQ3 are meant to measure perceived personal influence in the group. GQ4, on the other hand, is a measure of the degree to which IT affects the formal span of control. The correlation matrix for

the four dependent variables is shown in Table 3. As expected, GQ1, GQ2, and GQ3

	GQ1	GQ2	GQ3
General Question 1 (GQ1)	-		
General Question 2 (GQ2)	.809	-	
General Question 3 (GQ3)	.835	.777	-
General Question 4 (GQ4)	.422	.361	.385

Table 3
Correlations Among Dependent variables

were highly correlated. The correlation coefficients between GQ4 and the other three dependent variables were much lower in comparison. The result therefore confirmed our assumption that personal influence is not synonymous with hierarchical authority. The three measures of perceived personal influence displayed good reliability, with an overall reliability coefficient of 0.93.

4. ANALYSIS AND RESULTS

In order to test the hypotheses presented the analysis will focus on the development of relationships between the effect of IT usage on personal influence and the five underlying factors identified. The average scores of item measures were used as single measures for the five independent variables, and the average score of GQ1, GQ2, and GQ3 was used as the dependent variable (GQ). Formal span of control (GQ4) was independently examined. To test our hypotheses, we performed correlation analysis of power base measures with influence measures. In addition, multiple regression analysis and exploratory path analysis were employed to separate out covariance among power base measures and demonstrate the independent contribution of each power base to personal influence with IT usage.

4.1. Influence and Power Bases

H1 through H5 state that the greater the effect of IT impact on a power base measure, the greater will be the effect of IT usage on personal influence, where the power base measures are resource provision (RP), irreplaceability (IR), authority (AU), network centrality (NC), and expertise (EX). To test the hypotheses we had to establish that GQ (the average scores of GQ1, GQ2, and GQ3) and GQ4 scores were highly correlated to each power base measure. The tests were carried out separately for the administrative and technical personnel. The correlation matrices for the two groups are given in Tables 4 and 5. The correlation tables provided general support for the hypotheses, H1 through H5. Resource provision (RP) was strongly correlated with the influence measure GQ, for both administrative and technical personnel. The result, therefore, supported a general resource dependency theory; that is, a social actor who is able to provide valuable resources gains more power.

The correlations between irreplaceability (IR) and GQ and between authority (AU) and GQ were similar for both administrative and technical personnel. The correlations between network centrality (NC) and GQ and between expertise (EX) and GQ were substantially different for the two classes of personnel, but were all positive. The tables show a remarkable difference in the relative importance of each power base in predicting influence for technical and administrative personnel. Therefore, the two types of personnel will be discussed separately in the following sections.

As expected, the formal span of control measure (GQ4) and the power base measures were poorly correlated. For administrative personnel, the correlations were all less than 0.200. For technical personnel, the correlations between

	General Question (GQ)	General Question4 (GQ4)	RP	IR	AU	NC
Resource Provision (RP)	.733	.105				
Irreplaceability (IR)	.413	.092	.424			
Authority (AU)	.510	.200	.319	.258		
Network Centrality (NC)	.776	.071	.824	.421	.326	
Expertise (EX)	.399	.087	.294	.326	.463	.616

Table 4
Correlations: Influence Measures and Power Bases for ***Administrative Personnel***

	General Question (GQ)	General Question4 (GQ4)	RP	IR	AU	NC
Resource Provision (RP)	.643	.354				
Irreplaceability (IR)	.468	.451	.478			
Authority (AU)	.594	.327	.602	.460		
Network Centrality (NC)	.355	-.192	.402	.188	.317	
Expertise (EX)	.487	.156	.535	.186	.617	.249

Table 5
Correlations: Influence Measures and Power Bases for ***Technical Personnel***

irreplaceability (IR), resource provision (RP), and authority (AU) with the influence measure (GQ) were significant. However, multiple regression analysis showed that

R-square was less than 0.260. Therefore, we cannot conclude that the IT impact on formal span of control is significantly related to power base measures. Since our study concerns personal influence changed with IT usage, rather than changed hierarchical span of control, we will not discuss GQ4 further and will focus on the relationship between GQ and power bases in the following sections.

4.2. Administrative Personnel

For administrative personnel, network centrality (NC) was the measure most significantly related to GQ and expertise (EX) the least significant. The work flow is mainly informational for administrative personnel. Thus, the possibility of obtaining critical information can be enhanced through increased contacts with others. The correlation between resource provision (RP) and network centrality (NC) was high (0.824). The high correlation between the two suggests that the ability to get the most valuable resource, namely information, can be enhanced with a position of network centrality. Saunders and Scamell [1982] examined power bases and power in universities and oil-and-gas companies. In their study, pervasiveness, operationalized by similar questions of network centrality, was more significantly related to power in universities, where work flow was mostly informational, than in the gas-and-oil companies. Thompson [1967] claimed that the managerial (administrative) function services the technical function by: 1) mediating between the technical suborganization and those who use its products, and 2) procuring the resources necessary for carrying out the technical functions. These two correspond to network centrality and resource provision in the context of IT impacts in our study.

In order to assess the independent contribution of each power base, multivariate analysis was required. A complication arose because our measures of network

centrality (NC) and resource provision (RP) were somewhat collinear as shown in Table 4. Therefore, we had to deal with the issue of collinearity before proceeding with multiple regression analysis. We regressed each power base on the other power bases to obtain the variance inflation factors (VIFs). The VIF for each independent variable measures the combined effect of the dependencies among regressors on the variance of that term. Practical experience indicates that if any of the VIFs exceeds 5, it is an indication that the associated regression coefficients are poorly estimated because of multicollinearity [Montgomery and Peck 1982]. In our case, only network centrality (NC) had a VIF which exceeded 5. The unusually high correlation between resource provision (RP) and network centrality (NC) was the cause of collinearity. Since the correlation of network centrality with the dependent variable (GQ) was higher than that of resource provision and network centrality was the variable to be examined for the hypothesis, H6, we dropped RP in favor of NC for the multiple regression analysis. The elimination of RP resulted in all VIFs being lower than 5. The results of regression are given in Table 6. As expected,

	Regression Equation	R-Square	Adjusted R-Square
Administrative personnel	0.683 NC** + 0.287AU*	0.677	0.645
Technical personnel	0 448 RP** + 0.324 AU **	0.481	0.466

* $p<0.05$
** $p<0.01$
All parameters in the regression are equivalent to the beta coefficients

Table 6
Stepwise Multiple Regression Results

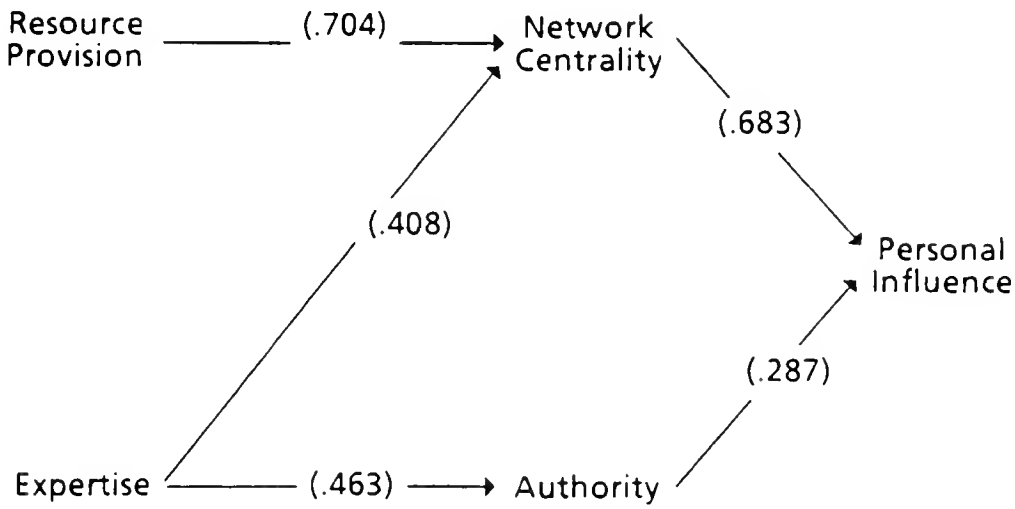
network centrality (NC) was the most important contributing factor to personal

influence perceived with IT usage. Authority was another significant contributing factor to influence.

The power base factors, irreplaceability (IR) and expertise (EX), were not significant in the regression analysis. However, the correlation matrix in Table 4 indicates that these variables were significantly related to the influence measure. The difference stems from the fact that the correlations between the independent variables were significant in many cases, and thus assessing the contribution of each power base using multiple regression may not be adequate. Therefore, we applied a modified version of path analysis to assess the direct and indirect effects of power bases on personal influence perceived due to IT usage. It should be noted that path analysis requires *a priori* theoretical models before performing statistical analysis. The path coefficients which represent the magnitude of causal effects are derived from the standardized regression coefficients obtained by regressing each variable on the prior significant causal variables [Heise 1969]. Even though we had identified the power bases from theoretical literature and we would attempt to establish theoretical meanings of causal relations during the path analysis, the causal relations between power bases were not established *a priori*. In this regard, our path analysis should be viewed as strictly exploratory. In our case the only purpose of using path analysis was to obtain possible contribution of each power base to effects of IT usage on personal influence, not to eastablish the causal paths between the power bases.

We regressed GQ on all power bases (this is equivalent to our previous regression analysis), and selected only the significant independent variables. The selected power bases were regressed on other power bases if the causal relation seemed logical. Our criteria for establishing a causal path called for both a plausible

theoretical link between two variables and a statistically significant path coefficient. Figure 1 is the result of this procedure.



Summary of effects

power bases	Total Effects
Network Centrality	.683
Resource Provision	.481
Expertise	.411
Authority	.287

*All coefficients are standardized.

Figure 1
The Result of Path Analysis for ***Administrative Personnel***

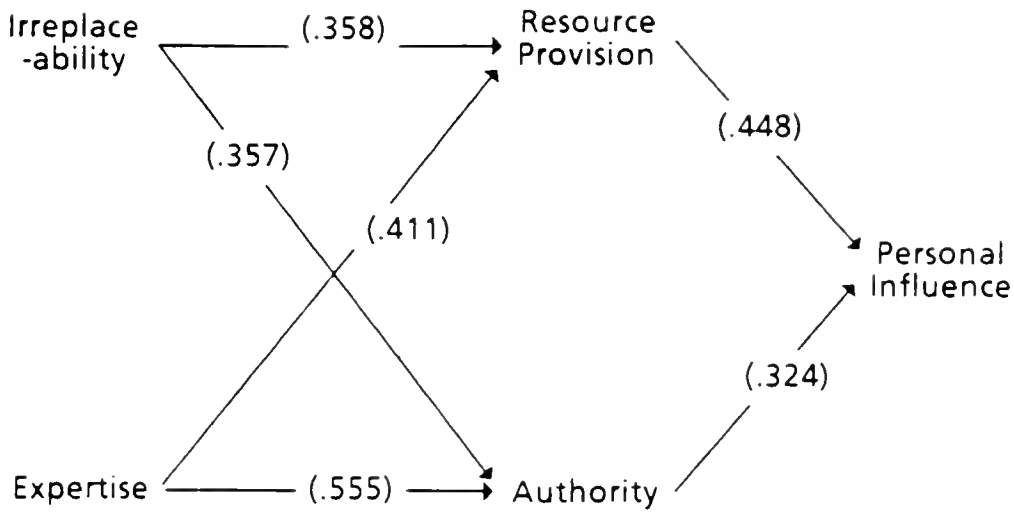
The exploratory path analysis showed that network centrality (NC) was the most significant factor of influence for administrative personnel, followed by resource provision (RP) and expertise (EX). Therefore, both the multiple regression and exploratory path analysis provided support for H6: For administrative personnel, the impact of IT on network centrality is the most important contributor to the effect of IT usage on personal influence. The path analysis showed that expertise and resource provision can affect personal influence indirectly through network

centrality. As discussed earlier, one of the most valued resources for administrative personnel is information. An administrative person who can provide relevant information will be able to shift the pattern of communications in the organizational network towards him as a center. Similarly, increased expertise with IT usage can also contribute to being located in the center of communication network, thereby increasing personal influence. Irreplaceability was not a significant factor. This is not surprising since administrative personnel do not engage in organizational core activities and IT tends to automate administrative activities.

4.3. Technical Personnel

The correlation matrix for the technical people as shown in Table 5 revealed that resource provision (RP) was the measure most significantly related to influence, followed by authority (AU), expertise (EX), and irreplaceability (IR). The stepwise multiple regression analysis in Table 6 again showed that resource provision (RP) was the most significant contributor to influence. Authority (AU) was significant while network centrality (NC) and expertise (EX) were not. The data, therefore, did not support our hypothesis H7: For technical personnel, the impact of IT on expertise is the most important contributor to the effect of IT usage on personal influence. A modified version of the path analysis discussed in the previous section was performed. The result is shown in Figure 2.

The exploratory path analysis showed that resource provision (RP) was the most significant factor of influence for technical personnel, followed by expertise (EX) and authority (AU). In organizational core functions, resources are derived from the knowledge of the core technology of the organization (expertise) and expertise manifests itself in the form of power through one's ability to provide knowledge



Summary of effects

power bases	Total Effects
Resource Provision	.448
Expertise	.364
Authority	.324
Irreplaceability	.276

*All coefficients are standardized.

Figure 2
The Result of Path Analysis for ***Technical Personnel***

(resource). The path analysis also showed that authority was related strongly to expertise. This relationship is particularly evident for technical personnel since managers can delegate more responsibility if they are convinced that the technical subordinates possess the expertise to carry out the tasks. Thus, expertise remains an important contributor to personal influence for technical personnel through its links to resource provision and authority. This argument was further supported by the high correlations between authority and expertise (0.617) and between resource provision and expertise (0.535).

Network centrality was not a significant factor of influence for technical personnel. Thompson [1967] argued that the closed-system aspects of organization are seen most at the technical level. Technical personnel are closed off in the technical core and are least significantly affected by the environment. Therefore, having the position of network centrality is not an important source of influence compared to other aspects of power bases.

5. DISCUSSION AND CONCLUSIONS

In general, the empirical data did not allow us to reject the general model that the impact of IT on personal influence can be explained through its impacts on resource provision, irreplaceability, authority, network centrality, and expertise. Correlation analysis of the data as shown in Tables 4 and 5 provided general support for the model. Multiple regression and exploratory path analyses were used to single out the direct and indirect factors of power/influence due to IT usage. For administrative personnel, the direct contributors to influence were network centrality and authority. Resource provision contributed indirectly through network centrality and expertise contributed through both network centrality and authority. For technical personnel, the direct contributors to influence were resource provision and authority, while irreplaceability and expertise contributed indirectly through both the primary factors. It should be noted that the path analysis we performed was exploratory. Since the causal models can only be confirmed with *a priori* theoretical models, new empirical data is required to confirm our path analysis results.

As hypothesized, IT appears to affect the influence of administrative personnel through its effect on the centrality of these people on the organizational network.

IT can serve to increase or decrease network centrality. For example, the use of electronic mail may help a social actor in an organization to access or disseminate information and thus he can serve the role of information gatekeeper. The same piece of technology may decrease a social actor's influence because the shift in communications can bypass him.

For technical personnel, the effect of IT on influence is primarily through resource provision. We had hypothesized that the impact may be primarily through expertise since this is the traditional base of power for technical personnel. The contradiction may have arisen because the information technology examined in this case was primarily office automation systems which had little effect on technical expertise. Nevertheless, the exploratory path analysis suggested that expertise enhances influence indirectly through its contributions to resource provision and authority. The link is plausible since technical expertise is a valuable resource that a person can provide to other members in the organization and that expertise brings more responsibility to the system's users.

For both administrative and technical personnel, the regression results in Table 6 indicated high R-square coefficients, especially considering the fact that we have not controlled for the attenuating effects of measurement error. The significantly higher R-square coefficient for administrative personnel suggest that the power base variables were a better set of intervening variables to explain IT's effects on influence than they were for technical personnel. The difference appears to stem from the characteristics of the information systems used by our respondents. Had the systems studied been oriented more toward the technical people, the results might well have been reversed.

The positive results we obtained from the empirical data suggested that the model we drew from the perspective of power base theory is a good predictor of

the effect of IT usage on influence. Thus, the study also provided further support for the power base school of the power/influence field. The correlation results in Tables 4 and 5 and the multiple regression results in Table 6 as well as the path analyses in Figures 1 and 2 indicated important differences in the mechanisms by which IT affects influence for technical and administrative personnel. The significant differences stemmed from differences in tasks performed and roles played in the organization. Therefore, the power base models may have important intervening variables which have yet to be explained in the literature.

The items in Table 2 provide a useful instrument for further studies of IT impacts on influence. The instrument appears to be robust, although minor modifications could be made based on the empirical analysis that we performed. Further study is warranted to understand this important area of IT impact. We need to expand the study to look at alternative forms of IT and alternative types of task and roles. We also need to strengthen the understanding of causality with a research design that incorporates pre- and post-test measurements over time.

The results of our study provide useful and interesting implications from the managerial perspective. The change of an individual's influence in an organization appears to be driven by the pattern of use of technology and not necessarily by the technology itself. For example, Gerrity [1971] reported that while his Portfolio Management System had been designed to help facilitate portfolio management, each user adapted the system to his own needs and evolved new applications which were different from original purposes. It also appears that shifts in personal influence in an organization due to IT usage are brought about through not one, but several variables. Thus, the ability to predict the outcome in the influence pattern due to IT usage is quite difficult. The results of this and other future studies should help shed some light on this area.

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